## CLAIMS

Claims 1-10 (Canceled)

11. (Currently Amended) A process chamber ~~as in claim 8 wherein:~~ for processing large substrates, comprising:

a pallet for supporting and protecting one large substrate during processing in said process chamber, said pallet comprising:

one large substrate;

~~said pallet bottom comprises means for preventing relative motion between said one large substrate and said pallet bottom whenever said pallet is assembled; and~~

~~said pallet top further comprises:~~

a pallet top, wherein said pallet top comprises (i) a multiplicity of contactors for making electrical contact with a multiplicity of test pads on the surface of said one large substrate, wherein there is a predetermined one-to-one mapping between said contactors and said test pads; (ii) means for detecting the locations of at least two alignment marks on the surface of said one large substrate; (iii) means for determining a required displacement vector for said pallet top with respect to said one large substrate, said required displacement vector being defined as that displacement of said pallet top with respect to said one large substrate that would approximately center said contactors with respect to said test pads, consistent with said predetermined one-to-one mapping between said contactors and said test pads; and (iv) means for precisely displacing said pallet top with respect to said pallet bottom, according to said required displacement vector; [[.]]

a pallet bottom;

wherein said one large substrate is clamped between said pallet top and said pallet bottom, and said pallet bottom comprises means for preventing relative motion between said one large substrate and said pallet bottom whenever said pallet is assembled; and

a port configured to accommodate passage of said pallet into and out of said processing chamber.

12. (Canceled)

13. (Currently Amended) A process chamber ~~as in claim 6 further comprising:~~ for processing large substrates, comprising:

a pallet for supporting and protecting one large substrate during processing in said process chamber, said pallet comprising:

one large substrate;

a pallet top; and

a pallet bottom;

wherein said one large substrate is clamped between said pallet top and said pallet bottom;

a port configured to accommodate passage of said pallet into and out of said processing chamber;

at least one pallet X-axis position sensor, said X-axis being parallel to said motion of said pallet under said charged particle optical assembly;

at least one pallet Y-axis position sensor, said Y-axis being perpendicular to said motion of said pallet under said charged particle optical assembly; and

at least one pallet Yaw sensor, said Yaw being defined as the rotation angle about an axis perpendicular to the plane of said one large substrate in said pallet.

14. (Original) A system for processing of large substrates, comprising:

a system control;

a multiplicity of pallets, each of said pallets comprising one large substrate;

a process chamber including a first port configured to accommodate passage of one of said pallets;

a loadlock assembly comprising a multitude of loadlocks, said loadlock assembly being coupled to said process chamber and to said pallet elevator, said loadlock assembly being configured to accommodate a first plurality of pallets of said multiplicity of pallets; and

a pallet elevator including a second port configured to accommodate passage of one or more of said pallets, said pallet elevator being configured to accommodate a second plurality of pallets of said multiplicity of pallets;

wherein:

said loadlock assembly is configured to move relative to said process chamber to allow positioning of any one pallet of said first plurality of pallets for passage through said first port in said process chamber; and

said pallet elevator is configured to move relative to said loadlock assembly to allow positioning of any one pallet of said second plurality of pallets for passage through said second port in said pallet elevator.

15. (Original) A system as in claim 14 wherein each of said pallets further comprises:

a pallet top; and

a pallet bottom;

wherein said one large substrate is clamped between said pallet top and said pallet bottom.

16. (Original) A system as in claim 14 wherein:

said process chamber further comprises a charged particle optical assembly, said charged particle optical assembly comprising a plurality of charged particle optical columns, wherein each of said charged particle optical columns comprises:

a charged particle source for generating a charged particle beam;

a plurality of lenses for focusing said charged particle beam onto the surface of said large substrate; and

a beam deflector for deflecting said charged particle beam on the surface of said large substrate; and

said system for processing of large substrates further comprises an optics control, electrically connected to:

said charged particle optical assembly; and

said system control.

17. (Original) A system as in claim 16 wherein said process chamber further comprises a plurality of bi-directional motor-driven rollers configured to support and to assist in moving one pallet of said first plurality of pallets under said charged particle optical assembly for charged particle beam testing of said large substrate in said pallet.

18. (Original) A system as in claim 14 wherein each of said loadlocks comprises one or more sets of bi-directional motor-driven rollers, each of said sets of bi-directional motor-driven rollers being configured to support one of said pallets of said first plurality of pallets in said loadlock, and to assist in moving one of said pallets of said first plurality of pallets into and out of said loadlock through said first port in said process chamber and through said second port in said pallet elevator.

19. (Original) A system as in claim 14 wherein said pallet elevator comprises one or more sets of bi-directional motor-driven rollers, each of said sets of bi-directional motor-driven rollers being configured to support one of said pallets of said second plurality of pallets in said pallet elevator, and to assist in moving one of said pallets of said second plurality of pallets into and out of said pallet elevator through said second port in said pallet elevator.

20. (Original) A system as in claim 15 wherein said pallet elevator further comprises:

a plurality of pin plates, wherein one pin plate of said plurality of pin plates is positioned beneath each set of bi-directional motor-driven rollers; and

a pin plate actuator configured to move said plurality of pin plates along a vertical motion axis.

21. (Original) A system as in claim 20 wherein each pin plate of said plurality of pin plates comprises:

a multiplicity of long pins; and

a multiplicity of short pins;

wherein said vertical motion axis is configured to enable said multiplicity of long pins and said multiplicity of short pins to pass through a multiplicity of holes in said pallet bottom, said motion of said pin plate thereby enabling:

said multiplicity of long pins to lift said pallet top off of said large substrate and to lift said pallet top off of said pallet bottom; and

said multiplicity of short pins to lift said one large substrate off said pallet bottom.

22. (Original) A system as in claim 15 wherein said pallet top comprises a multiplicity of contactors for making electrical contact with a multiplicity of test pads on the surface of said one

large substrate, wherein there is a predetermined one-to-one mapping between said contactors and said test pads.

23. (Original) A system as in elaim 22 wherein each pallet of said multiplicity of pallets further eomprises:

internal drive elcctronies for controlling a multiplicity of signals directed to said multiplicity of contactors, wherein there is a predetermined one-to-one mapping between said signals and said contactors;

an internal power distribution system to supply power to said internal drive eleetronies; and

means for storing energy for said internal power distribution system.

24. (Original) A system as in elaim 23 wherein:

eaeh pallet of said multiplicity of pallets further eomprises:

a first data reeeiver conneeted to said internal drive electronies; and

a first data transmitter eonneeted to said internal drive eleetronies; and

said proeess ehamber further eomprises:

a second data transmitter for transmitting data to said first data receiver in said pallet, said second data transmitter being eleetrieally eonneeted to said system eontrol; and

a second data receiver for reeeiving data from said first data transmitter in said pallet, said seeond data reeeiver being eleetrieally eonneeted to said system eontrol.

25. (Original) A system as in elaim 22 wherein:

said pallet bottom eomprises means for preventing relative motion between said large substrate and said pallet bottom whenever said pallet is assembled; and

said pallet top further comprises:

means for detecting the locations of at least two alignment marks on the surface of said large substrate;

means for determining a required displacement vector for said pallet top with respect to said large substrate, said required displacement vector being defined as that displacement of said pallet top with respect to said large substrate that would approximately center said contactors with respect to said test pads, consistent with said predetermined one-to-one mapping between said contactors and said test pads; and

means for precisely displacing said pallet top with respect to said pallet bottom, according to said required displacement vector.

26. (Original) A system as in claim 24 wherein:

said system for processing of large substrates further comprises an X-Y-Yaw readout, electrically connected to said system control; and

said process chamber further comprises:

at least one pallet X-axis position sensor, said X-axis being parallel to said motion of said pallets under said charged particle optical assembly, said at least one X-axis position sensor being electrically connected to said X-Y-Yaw readout;

at least one pallet Y-axis position sensor, said Y-axis being perpendicular to said motion of said pallets under said charged particle optical assembly, said at least one Y-axis position sensor being electrically connected to said X-Y-Yaw readout; and

at least one pallet Yaw sensor, said Yaw being defined as the rotation angle about an axis perpendicular to the plane of said large substrate in said pallet, said at least one Yaw sensor being electrically connected to said X-Y-Yaw readout.

27. (Original) A system as in claim 26 wherein said system control sends said pallet X-axis position data, said pallet Y-axis position data, and said pallet Yaw data to:

said optics control for controlling said beam deflector; and

said second data transmitter for transmission to said first receiver on said pallet, for use by said internal drive electronics for controlling said multiplicity of signals directed to said multiplicity of contactors.

Claims 28-29: (Canceled)

30. (Currently Amended) A system ~~as in claim 28 wherein:~~ for processing of large substrates, comprising:

a system control;

a multiplicity of pallets, each of said pallets comprising one large substrate;

a process chamber including a port configured to accommodate passage of one of said pallets, said process chamber ~~further comprises~~ including a charged particle optical assembly, said charged particle optical assembly comprising a plurality of charged particle optical columns, wherein each of said charged particle optical columns comprises[[:]] (i) a charged particle source for generating a charged particle beam; (ii) a plurality of lenses for focusing said charged particle beam onto the surface of said large substrate; and (iii) a beam deflector for deflecting said charged particle beam on the surface of said large substrate; ~~and~~

~~said system for processing of large substrates further comprises~~ an optics control, electrically connected to[[:]] said charged particle optical assembly[[;]] and said system control; and

a loadlock assembly comprising a multitude of loadlocks, said loadlock assembly being coupled to said process chamber, said loadlock assembly being configured to accommodate a

plurality of pallets of said multiplicity of pallets, wherein said loadlock assembly is configured to move relative to said process chamber to allow positioning of any one pallet of said plurality of pallets for passage through said port in said process chamber.

31. (Original) A system as in claim 30 wherein said process chamber further comprises a plurality of bi-directional motor-driven rollers configured to support and to assist in moving one pallet of said plurality of pallets under said charged particle optical assembly for charged particle beam testing of said large substrate in said pallet.

Claims 32-33: (Canceled)

34. (Currently Amended) A system ~~as in claim 33~~ for processing of large substrates, comprising:

a system control;

a multiplicity of pallets, each of said pallets comprising one large substrate, wherein each of said pallets further comprises a pallet top and a pallet bottom, wherein said one large substrate is clamped between said pallet top and said pallet bottom;

a process chamber including a port configured to accommodate passage of one of said pallets; and

a loadlock assembly comprising a multitude of loadlocks, said loadlock assembly being coupled to said process chamber, said loadlock assembly being configured to accommodate a plurality of pallets of said multiplicity of pallets, wherein each of said loadlocks comprises (i) a plurality of pin plates, wherein one pin plate of said plurality of pin plates is positioned beneath

each set of bi-directional motor-driven rollers, and (ii) a pin plate actuator configured to move said plurality of pin plates along a vertical motion axis;

wherein said loadlock assembly is configured to move relative to said process chamber to allow positioning of any one pallet of said plurality of pallets for passage through said port in said process chamber, and wherein each pin plate of said plurality of pin plates comprises[[:]] (i) a multiplicity of long pins[[;]] and (ii) a multiplicity of short pins[[;]] , wherein said vertical motion axis is configured to enable said multiplicity of long pins and said multiplicity of short pins to pass through a multiplicity of holes in said pallet bottom, said motion of said pin plate thereby enabling[[:]] said multiplicity of long pins to lift said pallet top off of said large substrate and to lift said pallet top off of said pallet bottom[[;]] ,and said multiplicity of short pins to lift said large substrate off said pallet bottom.

35. (Canceled)

36. (Currently Amended) A system ~~as in claim 35~~ for processing of large substrates, comprising:

a system control;

a multiplicity of pallets, each of said pallets comprising one large substrate, wherein each of said pallets further comprises a pallet top and a pallet bottom, wherein said one large substrate is clamped between said pallet top and said pallet bottom, wherein said pallet top comprises a multiplicity of contactors for making electrical contact with a multiplicity of test pads on the surface of said large substrate, wherein there is a predetermined one-to-one mapping between said contactors and said test pads, and wherein each pallet of said multiplicity of pallets further comprises[[:]] (i) internal drive electronics for controlling a multiplicity of signals directed to said multiplicity of contactors, wherein there is a predetermined one-to-one mapping between

said signals and said contactors; (ii) an internal power distribution system to supply power to said internal drive electronics; and (iii) means for storing energy for said internal power distribution system; [[.]]

a proeess chamber ineluding a port eonfigured to accommodate passage of one of said pallets; and

a loadlock assembly comprising a multitude of loadlocks, said loadlock assembly being coupled to said process chamber, said loadlock assembly being configured to accommodate a plurality of pallets of said multiplieity of pallets,

wherein said loadloek assembly is eonfigured to move relative to said process chamber to allow positioning of any one pallet of said plurality of pallets for passage through said port in said process chamber.

37. (Original) A system as in claim 36 wherein:

each of said pallets of said multiplieity of pallets further comprises:

a first data reeeiver conneeted to said internal drive electronies; and

a first data transmitter conneeted to said internal drive eleetronics; and

said proeess chamber further eomprises:

a second data transmitter for transmitting data to said first data reeeiver in said pallet, said seeond data transmitter being eleetrieally eonneeted to said system control; and

a second data receiver for receiving data from said first data transmitter in said pallet, said second data receiver being electrically conneeted to said system control.

38. (Currently Amended) A system ~~as in claim 35~~ for processing of large substrates, comprising:

a system control;

a multiplicity of pallets, each of said pallets comprising one large substrate, wherein each of said pallets further comprises a pallet top and a pallet bottom, wherein said one large substrate is clamped between said pallet top and said pallet bottom, wherein said pallet top comprises a multiplicity of contactors for making electrical contact with a multiplicity of test pads on the surface of said large substrate, wherein there is a predetermined one-to-one mapping between said contactors and said test pads;

a process chamber including a port configured to accommodate passage of one of said pallets; and

a loadlock assembly comprising a multitude of loadlocks, said loadlock assembly being coupled to said process chamber, said loadlock assembly being configured to accommodate a plurality of pallets of said multiplicity of pallets,

wherein said loadlock assembly is configured to move relative to said process chamber to allow positioning of any one pallet of said plurality of pallets for passage through said port in said process chamber; said pallet bottom comprises means for preventing relative motion between said large substrate and said pallet bottom whenever said pallet is assembled; and said pallet top further comprises: (i) means for detecting the locations of at least two alignment marks on the surface of said large substrate; (ii) means for determining a required displacement vector for said pallet top with respect to said large substrate, said required displacement vector being defined as that displacement of said pallet top with respect to said large substrate that would approximately center said contactors with respect to said test pads, consistent with said predetermined one-to-one mapping between said contactors and said test pads; and (iii) means

for precisely displacing said pallet top with respect to said pallet bottom, according to said required displacement vector.

39. (Original) A system as in claim 37 wherein:

said system for processing of large substrates further comprises an X-Y-Yaw readout, electrically connected to said system control; and

said process chamber further comprises:

at least one pallet X-axis position sensor, said X-axis being parallel to said motion of said pallets under said charged particle optical assembly, said at least one X-axis position sensor being electrically connected to said X-Y-Yaw readout;

at least one pallet Y-axis position sensor, said Y-axis being perpendicular to said motion of said pallets under said charged particle optical assembly, said at least one Y-axis position sensor being electrically connected to said X-Y-Yaw readout; and

at least one pallet Yaw sensor, said Yaw being defined as the rotation angle about an axis perpendicular to the plane of said large substrate in said pallet, said at least one Yaw sensor being electrically connected to said X-Y-Yaw Readout.

40. (Original) A system as in claim 39 wherein said system control sends said pallet X-axis position data, said pallet Y-axis position data, and said pallet Yaw data to:

said optics control for controlling said beam deflector; and

said second data transmitter for transmission to said first receiver on said pallet, for use by said internal drive electronics to control said multiplicity of signals directed to said multiplicity of contactors.

41. (Original) A method for processing large substrates that protects and supports said large substrates from damage during processing, comprising the steps of:

a) inserting said large substrate between a pallet top and a pallet bottom, said pallet top and said pallet bottom being separated a sufficient distance to permit said insertion of said large substrate;

b) moving said pallet top, said large substrate, and said pallet bottom, together and mechanically locking said pallet top to said pallet bottom, thereby clamping said large substrate between;

c) inserting said pallet into a process chamber;

d) processing said large substrate clamped in said pallet in said process chamber;

e) after said processing is complete, removing said pallet from said process chamber;

f) unlocking said pallet top from said pallet bottom;

g) separating said pallet top, said large substrate, and said pallet bottom, said pallet top and said pallet bottom being separated a sufficient distance to permit said removal of said large substrate;

h) removing said large substrate from between said pallet top and said pallet bottom;

i) returning to step a), above and repeating said process for each said large substrate to be processed.

42. (Original) The method of claim 41 wherein said large substrate is a flat panel display substrate comprising a large number of pixels.

43. (Original) The method of claim 42 wherein said processing is electron-beam testing of said pixels on said flat panel display substrate.